Chapter 15
Environmental Health

This chapter describes the potential impacts to environmental health from materials proposed for onsite use at the proposed project sites. Materials include petroleum products, propane gas, chemicals used for processing, and biosolids. Additional details related to environmental health are included in Appendix E.

15.1 Existing Conditions

Prior work on the proposed project sites includes timber harvest and limited mining. These activities can introduce hazardous materials and pose a threat to the environment, but surveys of the site have revealed no such problems. At elevated levels, naturally occurring substances such as metals can be hazardous to human health and the environment. One soil sample from a boring drilled at the Lower Site was analyzed for total metals (Appendix B). The concentrations of detected metals in the soil were comparable to natural background concentrations of metals found statewide and regionally. Recent water quality data for the Sallal Water District's Well No. 3 indicate that groundwater quality is very good (Pancoast, 1999). Existing conditions are presumed to pose no threat to environmental health.

15.2 Environmental Impacts

15.2.1 Construction Impacts

During construction activities, no hazardous products would be stored onsite in large quantities (greater than 55 gallons). Construction activities are considered to be too short in duration to affect groundwater resources. A biosolids compost product will not be used during construction.

15.2.1.1 Alternative 1–No Action

No construction-related impacts would be associated with Alternative 1.

15.2.1.2 Alternatives 2, 3, and 4 (Including Limited Lower Site Mining)

Construction impacts to environmental health would be limited to leaks or spills from heavy machinery used for construction on the site. In addition, construction activities may include the use of temporary aboveground storage tanks and refueling operations at the project site. Control measures are based on technical standards published by the U.S. Environmental Protection Agency (EPA), Washington State Department of Ecology (Ecology), and King County. The primary compliance tool used during construction is

the stormwater discharge permit system established by the National Pollution Discharge Elimination System (NPDES) requirements of the Clean Water Act. The stormwater discharge permit requirements are administered at the local level by King County under the Stormwater Pollution Prevention Plan (SWPPP) requirements of the *Stormwater Design Manual*, including best management practices (BMPs) for erosion and sediment control, water quality protection, and spill prevention and response. If construction activities include the aboveground storage of fuel products in a single container with a capacity greater than 660 gallons, or an aggregate storage capacity of greater than 1,320 gallons, a Spill Prevention, Control and Countermeasure (SPCC) Plan is also required by federal law (40 CFR 112). The impacts of spills and leaks from machinery are discussed below under Operation Impacts. There is a low probability of impacts to environmental health from construction-related activities.

15.2.2 Operation Impacts

The Memorandum of Understanding (MOU) and the Conceptual Mining Plan (Appendix A) propose the use of "legally approved King County biosolids products" to reclaim and restore mined areas to productive forest cover. Biosolids are wastewater solids that are rich in nutrients and organic materials and have been treated to a level that allows beneficial recycling on land. They also have met the requirements of federal regulation 40 CFR Part 503 and the state biosolids rule Chapter 173-308 WAC. The levels of contaminants in King County biosolids are considered safe when applied according to state and federal regulations (EPA, 1993).

Biosolids have both soil conditioning and fertilizing value because they increase the organic matter content of the soil and add plant-essential nutrients such as nitrogen, phosphorus, sulfur, magnesium, and zinc. This is especially true for disturbed soils such as those that have been mined for topsoil or sand and gravel and need additions of organic matter and nutrients to bring them back to productive use.

The potential impacts evaluated in this section include those from the storage, use, and spill of petroleum products, propane gas, and chemicals that would be used for processing and biosolids use. Potential contamination could occur from leaks, spills, improper storage and handling, or improper use of these materials. A list of hazardous materials that would be stored onsite and methods of storage and handling, is located in Table 2-5 of this FEIS.

15.2.2.1 Alternative 1–No Action

Impacts under Alternative 1 could result from timber harvesting. Leaks or spills from heavy machinery could occur, but it is not possible to quantify impacts without a specific proposal.

15.2.2.2 Alternative 2–Proposal: Lower and Upper Sites Mining (Including Limited Lower Site Mining)

Fuel/Chemical Storage and Use

As indicated in Table 2-5, Alternative 2 would include the storage and handling of fuel products, primarily diesel, commercial lubricants, and maintenance-related products, and specialty chemicals for various process applications. The diesel storage capacities anticipated for the Proposal range from 14,000 gallons (refueling of equipment) to 34,000 gallons (equipment refueling and fuel for processing plant operation). Based on these quantities, 40 CFR 112 would require the preparation of an SPCC Plan within 6 months and implementation of the plan within 12 months of startup of a new storage facility. This document would be prepared and certified by a professional engineer, used as a tool for training of workers, and updated whenever a change in operations, process, or facilities occurred. In addition, the fuel storage facilities would need to comply with the standards of Chapter 173-180 WAC, Facility Contingency Plan and Response.

In addition, the Gravel Operation NPDES permit required for the Proposal would include preparation of a Spill Prevention and Emergency Response Plan by Cadman, Inc. A draft Spill Prevention and Emergency Response Plan has been prepared by Cadman, Inc. (Appendix A). Preparation and approval of this plan would occur during acquisition of the NPDES permit for the gravel operation.

Release of Contaminants

A potential for spills would exist from the storage and use of fuel and chemicals onsite. Petroleum hydrocarbons (such as diesel fuel and lubricants) would be the most likely contaminants to have a significant release, although others could be released in small quantities. This analysis focuses on the petroleum hydrocarbons because they have equal or greater environmental risk associated with their release than other chemicals and they have the potential to be released in the largest quantities.

Large volumes of petroleum hydrocarbons and propane would be stored in double-walled tanks and contained in secondary storage (such as concrete floors and enclosures), making high volume spills unlikely. Flammable materials would be stored in fireproof storage, making explosions highly unlikely. The largest quantity of potential pollutants without secondary storage would be contained either in a 55-gallon drum or in large machinery. Therefore, a potential release would not be expected to exceed 55 gallons.

Releases of hazardous materials would impact soils and could impact groundwater locally beneath the site and then migrate farther downgradient. Release of contaminants to surface water would be limited to the onsite

storage ponds. Migration from the ponds to water supply would be through groundwater.

Numeric modeling was performed to simulate an accidental release of diesel fuel to the pit ground surface using the U.S. EPA Hydrocarbon Spill Screening Model (HSSM) (EPA, 1997) (Appendix E). The model assesses how rapidly a surface petroleum spill migrates through the vadose zone (the zone of soil above the water table). The model run indicates diesel fuel would reach a depth of approximately 1.5 feet (0.43 meter) below the ground surface 30 days after the spill (Figure 6-12). Diesel fuel migration would be relatively slow through the sands and gravels beneath the site but could reach the water table if a sufficient buffer zone were not maintained and the spill were not cleaned up. (Refer to Chapter 6, Water, for a discussion of groundwater conditions beneath the Upper and Lower Sites.)

At the Lower Site, a minimum 5-foot buffer zone would be maintained. At the Upper Site, the buffer zone would be less than 5 feet in some isolated areas during winter and spring when groundwater levels are high.

If a significant spill occurs in those areas during winter or spring, the groundwater quality of a shallow perched aquifer could be impacted. The aquifer, which does not supply domestic water, is about 600 feet above the nearest domestic wells and more than 2,000 feet away horizontally. Overall, the potential for significant groundwater quality impacts would be low at both the Upper and Lower Sites. In the unlikely event of a significant groundwater quality impact, the potential exists that nearby springs and streams could also be affected; however, this potential is considered low because the size of the spill would most likely be small and the distance from the operation areas to the newest surface water is about 1/2 mile from the Lower Site and about 1,000 feet from the Upper Site.

In the event of a spill at the ground surface of the excavation pit floor, such as a petroleum release from a vehicle or storage tank, spilled liquid could infiltrate into the ground surface and affect local groundwater quality if not rapidly detected and cleaned up. The pit floor, 50 feet deep, would be closest to groundwater. As part of the onsite SPCC Plan and the Spill Prevention and Emergency Response Plan, procedures for the prevention, containment, control, and cleanup of spills or unplanned discharges of oil and petroleum products and other materials would be provided. Prevention of groundwater impacts would be dependent upon rapid observation and cleanup response to any spill.

The northern portion of the Lower Site is within the wellhead protection zone, and the eastern portion of the proposed excavation appears to be just outside the southern edge of the “capture” zone, for Sallal Water District Well No. 3. Potential travel times for groundwater from this portion of the site to the Sallal Well would be about 1 to 2 years (Compass Geographics, Inc., 1998). The travel time to wells farther downgradient is expected to be greater. As a result of natural processes, contaminants would move more

slowly on average than the groundwater and their concentrations would decrease in a downgradient direction.

Groundwater monitoring is proposed by Cadman, Inc. to assess groundwater flow directions and detect potential impacts on groundwater quality. With properly selected well locations, regular groundwater monitoring would detect any significant impacts before they migrate offsite or enter the designated wellhead protection area.

In areas where the buffer zone is limited in thickness or absent, impacts on groundwater quality could occur; however, given the limited potential for a significant release of contaminants, the slow rate of petroleum hydrocarbon movement through the soil, the substantial buffer zone beneath most of the site, and provided that the spill would be quickly identified and cleaned up, the potential for significant impacts on groundwater quality is considered low.

Flocculents

Flocculents would be used onsite to promote settling of particles from the process water collected in the settling ponds. The active ingredients of the flocculents is aluminum hydroxychloride. The proposed product (Nalco 7888) has a measurable toxicity to aquatic animals in its undiluted form. Nalco 7888 is typically diluted into a wash-water stream to a working concentration of 15 parts per million (ppm). After the treated water is discharged into the pond, the flocculent becomes bound to the sediment particles. In the settling ponds, the settled solids are biologically inert and would not infiltrate or impact groundwater. There would be no impact to biologically active water sources from use of this product.

Biosolids

From an environmental standpoint, the primary risk from use of biosolids results from an overapplication of plant-available nitrogen. Excess plant-available nitrogen in the form of nitrate may move down through the soil profile and contaminate groundwater. Nitrate contribution to the groundwater is likely to occur when biosolids alone are used at the quantities needed to achieve mine reclamation. Thus, the use of biosolids alone as a soil amendment is not recommended in mine reclamation. The preferred technique is carbon and nitrogen balancing, which combines a carbon-rich, nitrogen-deficient source of organic matter such as wood chips or sawdust with the nitrogen-rich biosolids (Cogger, 2000; Henry, 1999). Microbes naturally decomposing the carbon source use nitrogen from the biosolids, transforming it from plant-available nitrogen to organic nitrogen. Other plant-available nitrogen is taken up by plants, which leave little available for leaching. A biosolids compost, or a similar mixture of Class A biosolids and carbon-rich materials, is proposed for mine reclamation.

Because reclamation is proposed over the life of the proposed project, the King County biosolids products that will be available cannot be predicted

with certainty. GroCo compost is representative of a product made with King County biosolids. GroCo consists of approximately one part biosolids and three to four parts sawdust. Due to sustained high temperatures during composting, GroCo meets federal pathogen reduction standards. It is tested at maturity to meet all applicable requirements, which include testing for pathogens, vector attraction, and metals.

All biosolids products contain some metallic elements. Typical metals concentrations in the King County biosolids and GroCo are summarized in Table 15-1. GroCo metals concentrations fall below the pollutant concentration limits outlined in the regulation. The product is considered an "exceptional quality biosolids" or Class A biosolids by Ecology. EPA has conducted environmental risk assessments for the application of biosolids. The concentrations of contaminants allowed in these products are considered to pose relatively low risks (EPA, 1995). The traces of organic chemicals in biosolids are present in such low concentrations that they are not regulated by the state or federal government and are not considered a risk or a significant factor in the land application of biosolids (EPA, 1993).

Table 15-1
Metal Concentrations in GroCo and King County Biosolids Compared to Regulatory Limits

	EPA and Ecology Standards	King County Biosolids		GroCo Compost
	Pollutant Concentration Limit[a] for Exceptional Quality Biosolids (mg/kg)	Maximum (mg/kg)	Minimum (mg/kg)	Average[b] (mg/kg)
Arsenic	41	8.24	5.9	2.3
Cadmium	39	6.9	2.2	1.0
Copper	1500	718	425	181.4
Lead	300	175	38	32.3
Mercury	17	4.5	1.9	0.6
Nickel	420	41.3	16	9.0
Selenium	36 (100[c])	7.8	4.9	0.3
Zinc	2800	972	613	244.3

[a] 40 Code of Federal Regulations Part 503, Table 3
[b] Average of seven samples
[c] Chapter 173-308-160 Washington Administrative Code
mg/kg = milligrams per kilogram

Ecology has recently updated its best management guidelines for the use of biosolids products (Cogger et al., 2000). These guidelines include suggested widths for buffer zones which receive no biosolids. The minimum separations suggested are 33 feet (10 meters) from surface waters and a vertical separation from groundwater of at least 2 feet (0.6 meter). Additional guidelines developed by the University of Washington specifically for the use of biosolids compost in the Mountains to Sound Greenway

proposes buffers for various types of slopes, berms and application methods (Henry, 1996).

The primary impacts from the application of biosolids would be due to the potential transport of nutrients (nitrate, nitrite, and phosphate) into surface water or groundwater. Applying GroCo at greater than agronomic (uptake limits) rates could result in temporary (i.e., during the first year following application only) water quality degradation by nitrates in the biosolids. Metals in a biosolids compost remain tightly bound in inorganic complexes and to organic matter, would not tend to dissolve into surface water, and would be relatively immobile. When properly applied, the constituents in biosolids are either taken up by plants or bound in the soil matrix so that migration does not occur (according to Ecology). Biosolids must be applied to the land in a manner approved by Ecology and not at greater than agronomic rates, unless otherwise approved, because improper application may pose a threat to human health and/or the environment. With no significant surface water flow offsite, the potential impact would be primarily to the groundwater beneath the Lower and Upper Sites. However, with proper application using carbon and nitrogen balancing, no significant impacts are expected.

15.2.2.3 Alternative 3–Lower and Upper Sites Mining (Including Limited Lower Site Mining)

Potential impacts on groundwater quality at the Lower Site would be reduced under Alternative 3 compared with Alternative 2 because gravel processing would occur at the Upper Site and vehicular traffic and use of petroleum hydrocarbons at the Lower Site would be less. Therefore, the risk of potential impacts on groundwater quality at offsite water supply wells would be reduced. Under Alternative 3, gravel processing would occur at the Upper Site and vehicular traffic would increase. These activities would increase the potential for accidental releases of petroleum hydrocarbons and other chemicals at the Upper Site. The apparent absence of groundwater above the shallow perching layer in this area suggests that an adequate buffer zone would be maintained. Therefore, implementation of the Spill Prevention and Emergency Response Plan that meets federal regulations should adequately mitigate potential water quality impacts. Potential impacts due to the use of a biosolids compost product would be the same as those under Alternative 2.

15.2.2.4 Alternative 4–Upper Site Mining - Exit 38

Under Alternative 4, vehicle fueling and maintenance on the Upper Site would increase the potential for accidental releases of petroleum hydrocarbons and other chemicals. There is a greater potential that groundwater would be impacted when compared to Alternative 3. This would slightly increase the potential for groundwater quality impacts at water supply wells located downgradient of the Upper Site. However, the overall potential impacts to water quality would still be considered low.

The potential for direct impacts on groundwater quality at the Lower Site would be eliminated under Alternative 4 because the Lower Site would not be developed, and potential contaminant release on the Upper Site would not be likely to migrate to the Lower Site. Therefore, the risk of potential impacts to the Lower Site would be almost nonexistent under this alternative when compared to Alternatives 2 and 3. Potential impacts due to the use of biosolids would be limited to the Upper Site because the Lower Site would not be mined.

15.2.3 Cumulative Impacts

No cumulative impacts are expected under any alternative. Although there are no indications that a significant impact would result from the Proposal or other alternatives, the groundwater monitoring program proposed by Cadman, Inc. would identify any migration prior to impact on the water supply.

15.3 Mitigation Measures

15.3.1 Alternative 1–No Action

No mitigation measures are needed for Alternative 1.

15.3.2 Alternatives 2 and 3 (Including Limited Lower Site Mining)

15.3.2.1 Fuel/Chemical Storage and Use

The overall goal of surface water protection is to prevent impacts from chemicals and products used during site operations. The following mitigation measure is proposed:

- New employee training and periodic updates should emphasize the importance of surface water protection, operating policies and procedures, and proper chemical and product handling, storage, and disposal.

The following groundwater and surface water monitoring activities are proposed to confirm that the mitigation measures designed to protect water quality are effective:

- An additional monitoring well should be installed downgradient of the processing area in the event data shows that the well proposed for the northwest portion of the Lower Site is not located downgradient.
- The groundwater quality monitoring program recommended as mitigation in Chapter 6 should include groundwater sample analysis for chemicals (such as coagulants and flocculents) and petroleum products that would be used and stored onsite and are considered hazardous substances.

Other analytes that should be considered include drinking water parameters that may be affected by site processes and activities.

- The contingency water supply plan, recommended as mitigation in Chapter 6, should be prepared to provide a high quality water supply to the Sallal Water Association. The plan could be implemented if impacts from the gravel operation were detected at Sallal Well No. 3.
- The baseline water quality monitoring for the springs, recommended as mitigation in Chapter 6, should include surface water sample analysis for any hazardous substances that will be used on the Upper Site.

15.3.2.2 Biosolids

The following actions are proposed to mitigate the potential impacts associated with the use of GroCo or a comparable biosolids product and to confirm that the mitigation measures are effective in protecting groundwater quality:

- A site-specific application rate using carbon and nitrogen balancing for GroCo should be developed if this soil amendment is used during site reclamation.
- A land application plan for the use of GroCo should be developed for the Lower and Upper Sites prior to reclamation if GroCo would be applied in greater than agronomic rates. The plan should be prepared in accordance with the requirements of WAC 173-308-310(6)(iii) and the guidelines set forth by the University of Washington (Henry, 1996).
- If GroCo or other fertilizers are used for reclamation, groundwater beneath the Lower and Upper Sites should be sampled and analyzed for nitrates to detect potential impacts. If impacts are detected, corrective action should be taken to restore groundwater quality.

15.3.3 Alternative 4–Upper Site Mining - Exit 38

15.3.3.1 Fuel/Chemical Storage and Use

No mitigation would be required for the Lower Site under Alternative 4 because the Lower Site would not be mined. The mitigation measures for fuel and chemical storage and use at the Upper Site described under Alternatives 2 and 3 would also apply to Alternative 4.

15.3.3.2 Biosolids

No mitigation measures would be required for the Lower Site under Alternative 4 because it would not be mined. The mitigation measures for environmental health for the Upper Site described under Alternatives 2 and 3 would also apply to Alternative 4.

15.4 Significant Unavoidable Adverse Impacts

The proposed project is unlikely to have significant and unavoidable adverse impacts on water or environmental health if the proposed mitigation measures described are applied.